CLAIMS

1. A receiver for receiving a plurality of signals at the same time, said receiver comprising:

a plurality of receiving elements each of which is arranged to receive a composite signal including at least some of said plurality of signals;

processing means for providing a estimate of at least two of said plurality of signals, said processing means being arranged to provide an estimate of a first one of said signals and then to provide an estimate of a second one of said signals, wherein said estimate of said second one of said signals takes into account the estimate of the first signal and the estimate of the first signal can be modified in dependence on the estimate of the second signal.

2. A receiver as claimed in claim 1, wherein said processing means is arranged to provide an initial estimate of said plurality of signals, said processing means using said initial estimate as a first value for said first and second estimates.

3. A receiver as claimed in claim 1, wherein said processing means is arranged to provide an estimate of at least three signals and the estimate of each successive signal takes into account the previously determined signal estimates.

4. A receiver as claimed in claim 1 or 3, wherein said processing means is arranged to provide an estimate of at least three signals and any one or more of the previously determined estimated can be modified in dependence on a current signal estimate.

5. A receiver as claimed in any preceding claim, wherein said processing means is arranged to determine the order in which the signals are estimated.

6. A receiver as claimed in claim 5, wherein said processing means are arranged to determine the order in which the signals are estimated taking into account at least one of received signal level and signal to noise ratio.

7. A receiver as claimed in any preceding claim, wherein for each already determined estimate, the estimate is extended by extending the estimate with a plurality of potential values.

8. A receiver as claimed in claim 7, wherein said potential values comprise constellation points.

9. A receiver as claimed in claim 8, wherein said estimate is extended by every possible constellation point.

10. A receiver as claimed in any of claims 7 to 9, wherein said plurality of potential values comprise potential values for a currently estimated signal.

11. A receiver as claimed in any of claims 7 to 10, wherein a metric is determined for the extended estimates.

12. A receiver as claimed in claim 11, wherein at least some of said extended estimates are discarded in dependence on the determined metric.

13. A receiver as claimed in claim 11 or 12, wherein one or more existing estimates are discarded if a determined metric is better than that of said one or more existing estimates.

14. A receiver as claimed in any of claims 11 to 13, wherein said metric is based on a function of the currently determined estimates and the received signal

15. A receiver as claimed in claim 14, wherein said function is a squared Euclidean distance between said currently determined estimates and the received signal.

16. A receiver as claimed in any of the claims 11 to 14 wherein said metric is calculated for a signal estimate at least partially from metric values stored during the calculation of a previously determined estimate.

17. A receiver as claimed in any preceding claim, wherein said processor is arranged to treat those signals for which an estimate has not yet been determined as noise.

18. A receiver as claimed in any preceding claim, wherein the processor is arranged, before determining any estimates to calculate at least one of:

the matrix product of the channel transfer function multiplied by itself;

the squared length of the channel impulse response for at least one signal received by at least one receiving element; and

an inner function defined by the received signal multiplied by the channel impulse response.

19. A receiver as claimed in any preceding claim, wherein for each estimate, the quantities

$||r-H(v_s+v_e)||^2$, $||r-Hv_s||^2$, $2\Re\{(c_k-\hat{c}_k)^*(e_k{}^H H^H H v_s - h_k{}^H r)\}$, $|c_k-\hat{c}_k|^2||h_k||^2$

are calculated.

20. A receiver as claimed in any preceding claim, wherein said receiving elements comprise antennas.

21. A method for receiving a plurality of signals at the same time, said method comprising the steps:

receiving at each of a plurality of receiving elements a composite signal including at least some of said plurality of signals;

processing said received plurality of receiving elements' composite signal to provide a estimate of at least two of said plurality of signals;

said processing step being arranged to provide an estimate of a first one of said signals and then to provide an estimate of a second one of said signals,

wherein said estimate of said second one of said signals takes into account the estimate of the first signal and the estimate of the first signal can be modified in dependence on the estimate of the second signal.

22. A method as claimed in claim 21, wherein said processing step further provides an initial estimate of said plurality of signals, said processing step using said initial estimate as a first value for said first and second estimates.

23. A method as claimed in claim 21, wherein said processing step further provides an estimate of at least three signals and the estimate of each successive signal takes into account the previously determined signal estimates.

24. A method as claimed in claim 21 or 23, wherein said processing step provides an estimate of at least three signals and any one or more of the previously determined estimated can be modified in dependence on a current signal estimate.

25. A method as claimed in claims 21-24, wherein said processing step further determines the order in which the signals are estimated.

26. A method as claimed in claim 25, wherein said processing step further determines the order in which the signals are estimated taking into account at least one of received signal level and signal to noise ratio.

27. A method as claimed in claims 21-26, wherein during said processing step for each already determined estimate, the estimate is extended by extending the estimate with a plurality of potential values.

28. A method as claimed in claim 27, wherein said potential values comprise constellation points.

29. A method as claimed in claim 28, wherein said estimate is extended by every possible constellation point.

30. A method as claimed in any of claims 27 to 29, wherein said plurality of potential values comprise potential values for a currently estimated signal.

31. A method as claimed in any of claims 27 to 30, wherein a metric is determined for the extended estimates.

32. A method as claimed in claim 31, wherein at least some of said extended estimates are discarded in dependence on the determined metric.

33. A method as claimed in claim 31 or 32, wherein one or more existing estimates are discarded if a determined metric is better than that of said one or more existing estimates.

34. A method as claimed in any of claims 31 to 33, wherein said metric is based on a function of the currently determined estimates and the received signal

35. A method as claimed in claim 34, wherein said function is a squared Euclidean distance between said currently determined estimates and the received signal.

36. A method as claimed in any of the claims 31 to 34 wherein said metric is calculated for a signal estimate at least partially from metric values stored during the calculation of a previously determined estimate.

37. A method as claimed in claims 21-36, wherein the step of processing treats those signals for which an estimate has not yet been determined as noise.

38. A method as claimed in claims 21-37, wherein the step of processing further comprises the steps, prior to the step of determining any estimates, of calculating at least one of:

the matrix product of the channel transfer function multiplied by itself;

the squared length of the channel impulse response for at least one signal received by at least one receiving element; and

an inner function defined by the received signal multiplied by the channel impulse response.

39. A method as claimed in claims 21-37, wherein for each estimate, the quantities

$||r-H(v_s+v_e)||^2$, $||r-Hv_s||^2$, $2\Re\{(c_k-\hat{c}_k)^*(e_k{}^H H^H H v_s - h_k{}^H r)\}$, $|c_k-\hat{c}_k|^2||h_k||^2$ are calculated.